

**What is claimed is:**

- 1 1. A carbon nanotube device comprising:  
2 a catalyst island; and  
3 a carbon nanotube extending from the catalyst island.
- 1 2. The carbon nanotube device of claim 1, further comprising metal disposed  
2 between the catalyst island and the carbon nanotube.
- 1 3. The carbon nanotube device of claim 1, wherein the catalyst island includes  
2 metal.
- 1 4. The carbon nanotube device of claim 1, further comprising a substrate, wherein  
2 the catalyst island is disposed on a top surface of the substrate.
- 1 5. The carbon nanotube device of claim 1, further comprising a cantilever, wherein  
2 the catalyst island is disposed on the cantilever.
- 1 6. The carbon nanotube device of claim 5, further comprising an atomic force  
2 microscope that includes the cantilever.
- 1 7. The carbon nanotube device of claim 1, wherein the nanotube is a single-walled  
2 nanotube.

1 8. The carbon nanotube device of claim 1, wherein the catalyst island comprises  
2  $\text{Fe}_2\text{O}_3$ .

1 9. The carbon nanotube device of claim 1, wherein the catalyst island comprises a  
2 material selected from the group consisting of iron, molybdenum, cobalt, nickel,  
3 ruthenium, zinc and oxides thereof.

1 10. The carbon nanotube device of claim 1, wherein the catalyst island has a width of  
2 between about 1-5 microns.

1 11. The carbon nanotube device of claim 1, wherein the catalyst island comprises  
2 particles of ceramic material.

1 12. The carbon nanotube device of claim 1, further comprising a metal cover that  
2 covers an end portion of the nanotube and a portion of the island.

1 13. The carbon nanotube device of claim 1, wherein the carbon nanotube includes a  
2 first end coupled to the catalyst and a second free end, the free end being adapted to  
3 vibrate, wherein the carbon nanotube device is adapted for use as a resonator.

1 14. A system for manufacturing a carbon nanotube device, the system comprising a  
2 furnace chamber configured and arranged to grow a carbon nanotube from a catalyst  
3 island using a carbon feedstock gas.

1 15. The system of claim 14, wherein the furnace chamber is adapted to react the  
2 carbon feedstock gas with a catalyst.

1 16. The system of claim 15, where the furnace chamber is adapted to react the carbon  
2 feedstock gas using the catalyst at the catalyst island.

1 17. A carbon nanotube device comprising:  
2 a catalyst island;  
3 a circuit node; and  
4 a carbon nanotube extending between the catalyst island and the circuit node and  
5 configured and arranged to electrically connect the catalyst island to the circuit node.

1 18. The carbon nanotube device of claim 17, further comprising a substrate having a  
2 top surface, wherein the catalyst island is disposed on the top surface of the substrate.

1 19. The carbon nanotube device of claim 18 wherein the substrate comprises a trench  
2 under the nanotube, wherein a portion of the carbon nanotube is suspended over the  
3 trench.

1 20. The carbon nanotube device of claim 17, wherein the circuit node comprises a  
2 second catalyst island.

1 21. The carbon nanotube device of claim 20, further comprising a metal cap on at  
2 least one of the catalyst islands, the metal cap being adapted to electrically couple to the  
3 carbon nanotube.

1 22. The carbon nanotube device of claim 21, wherein the metal cap is adapted to  
2 secure the carbon nanotube to a catalyst island.

1 23. The carbon nanotube device of claim 17, wherein the circuit node comprises a  
2 metal pad.

1 24. A carbon nanotube device comprising:  
2 a cantilever having a free end and a fixed end;  
3 a catalyst particle disposed on the free end of the cantilever; and  
4 a carbon nanotube extending from the catalyst particle.

1 25. The carbon nanotube device of claim 24, further comprising a base, wherein the  
2 fixed end of the cantilever is fixed to the base and wherein the free end of the cantilever  
3 extends from the base.

1 26. The carbon nanotube device of claim 24, further comprising a tip on the free end  
2 of the cantilever, wherein the catalyst particle is disposed on the tip.

1 27. A method for manufacturing a carbon nanotube device with a tip comprising a  
2 carbon nanotube, the method comprising:  
3 disposing a catalyst particle on a free end of a cantilever; and  
4 contacting a carbon-containing gas to the catalyst particle at elevated temperature  
5 and growing a carbon nanotube from the catalyst particle.

1 28. The method of claim 27, wherein disposing a catalyst particle on the free end of  
2 the cantilever comprises:  
3 contacting the free end of the cantilever to a particle of oxide disposed on an  
4 electrically conductive substrate; and  
5 applying an electric field between the free end and the substrate and reacting the  
6 oxide to form a catalyst.

1 29. A method for manufacturing a carbon nanotube device, the method comprising:  
2 forming an island of catalyst material; and  
3 contacting the catalyst island with a carbon-containing gas and forming a carbon  
4 nanotube extending from the catalyst island.

1 30. The method of claim 29, wherein forming an island of catalyst material includes  
2 forming the island of catalyst material on a top surface of a substrate.

1 31. The method of claim 29, wherein contacting the catalyst island with a carbon-  
2 containing gas includes contacting the carbon-containing gas to the catalyst island for a  
3 period of time sufficient to form carbon nanotubes.

1 32. The method of claim 29, further comprising heating the catalyst material, prior to  
2 contacting the catalyst island with a carbon-containing gas.

1 33. The method of claim 29, wherein forming an island of catalyst material includes  
2 forming the island of catalyst material on a cantilever.

1 34. The method of claim 29, wherein contacting the catalyst island with a carbon  
2 containing gas includes contacting the catalyst island with a carbon containing gas that  
3 has been reacted using a catalyst.

1 35. The method of claim 29, further comprising reacting the carbon containing gas  
2 with a catalyst, prior to contacting the catalyst island with the carbon-containing gas and  
3 forming a carbon nanotube.

- 1 36. The method of claim 29, wherein forming an island of catalyst material includes
- 2 depositing an iron salt on a substrate and decomposing the iron salt, without mixing the
- 3 iron salt with nanoparticles.